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EXTENT AND IMPORTANCE OF THE CHESTNUT BARK DISEASE.

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EXTENT AND IMPORTANCE OF THE CHESTNUT BARK DISEASE.

INTRODUCTION.

Three years ago a destructive fungous disease of the chestnut first attracted attention and almost immediately assumed the character of an epidemic. It seems to be one of the most serious diseases which has ever attacked an American forest tree, and has done great damage locally in and around New York City, and is now spreading rapidly in all directions to forest tracts in Connecticut, New York, New Jersey, and even into Pennsylvania.

The disease was first studied by Dr. W. A. Merrill, of New York, and during the past eighteen months it has been under investigation by Dr. Haven Metcalf, of the Bureau of Plant Industry. The technical details given in this circular have been derived chiefly from the publications of the former and information supplied by the latter.

MANNER OF INFECTION.

The disease is caused by a fungus known as *Diaporthe parasitica* and *Valsonectria parasitica*, the spores of which enter the tree through wounds on branches or trunk. Dead twigs also offer a means of entrance, and there are probably other ways, not yet known, by which the trees become infected.

From the point of entrance the fungus spreads in all directions throughout the cambium and inner bark until it completely girdles the branch or trunk it has attacked. It has been found that a few of the outer annual rings of the wood are also attacked, and it is very likely that the fungus penetrates some of the medullary rays in search of the food material which they contain; but the real seat of the injury is the inner bark and the growing layer of the wood.

SYMPTOMS.

When a tree is first attacked the disease is not noticeable, and is likely to be overlooked. In many instances the trees are attacked first on the smaller branches. These are soon girdled, and the foliage turns yellow and then wilts. By these wilted branches the disease can be detected from a distance. The girdled branches or trees do not usually die until the second year, except when they are attacked very early in the season, or when the infected limbs are small.

On limbs with smooth bark the diseased patches are sunken and discolored, with small brownish or yellow knobs scattered over the surface. On the edge of the affected area in the growing season there is a ring of greenish, yellowish, or bright yellow excrescences which resemble horns and are very conspicuous, so that in young trees the disease is easily detected even before the branches wilt. In very dry weather, however, these horns may be nearly or entirely suppressed. Where the bark is thick, as on large trees, it is not changed in appearance, but the brownish knobs of the fruiting bodies show in the cracks, and the bark sounds hollow when struck.

On account of its rapid action in killing or wilting small branches, the disease can not remain long undetected if the trees are under inspection. At the end of a single year the disease has usually made its presence conspicuous by a large number of dead and dying trees.

LOCALITIES AFFECTED.

In 1905 the disease had already spread over a considerable area around New York City, where it apparently originated. In the present year it is spreading rapidly in a westerly direction over northern New Jersey, where in Morris County large tracts have recently been attacked. New York City is about the center of the infected area. Last year the chestnut tracts in Westchester and Nassau counties in New York, Fairfield County in Connecticut, and Bergen County in New Jersey were severely attacked, and now Morris, Essex, and Monmouth counties, N. J., can be added.

In Connecticut the disease is very severe at Stamford. It has been found near Danbury and Waterbury, and is known to extend along the coast to New London. It is also reported in southeastern Massachusetts and as far north as Wellesley.

On Long Island it is common in the western part and along the northern shore to Huntington. It is likely that it occurs on the island wherever there is chestnut, although it has not yet been reported from the eastern end. It extends up the Hudson to Poughkeepsie, and across the river to the west; it has been found, though not in great abundance, at Turner and Warwick, and has been reported at Marlborough. Near the Connecticut line it occurs as far north as Pawling and is very destructive from Katonah all the way southward to New York City.

In New Jersey the disease is very abundant in the northern and eastern parts, particularly near the coast in Bergen, Essex, and Monmouth counties. Southward it is found along the Delaware River to Trenton, and abundantly along the coast near Chapel Hill and Eatontown in the northern part of Monmouth County. Recently a belt around Morristown and German Valley has become badly infected, and the disease has been discovered in wild trees at Newark and Fenton, Del., and at various points near Philadelphia, Pa.

In Pennsylvania it is nowhere abundant yet, although it exists at Easton, South Bethlehem, and Morrisville, and is reported as far north as the Pocono Mountains and as far south now as Philadelphia. It has also been found near Baltimore, Md., and in Bedford County, Va.

The range at present, then, includes eight States: Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and Massachusetts. Pennsylvania, so far as known, is not infected to any great extent, except on the eastern border, while Massachusetts, Maryland, and Virginia are touched only at one or two points.

HOW THE DISEASE SPREADS.

The yellow fruiting bodies so common on the diseased trees are constantly giving off millions of summer spores all through the growing season. These are transported by various agencies to healthy trees, where they gain entrance through wounds in the bark. Wind is probably the principal agency, but the spores are no doubt carried by animals, birds, insects, and by shipment of infected material.

The disease spreads locally, through the gradual distribution of the spores from tree to tree, and at a distance, chiefly through the shipment of infected material, such as nursery stock, bark, nuts, and other products. There is a possibility that long distance infection is also effected by means of migratory birds.

There are a number of facts which support the view that the wind has been the principal agency in spreading the disease over the present area. For instance, trees in open spaces exposed to winds, such as those along roads, at the edges of woods, or near streams or ponds, are apt to be infected sooner than the trees in more sheltered situations; trees on slopes or in depressions with diseased trees on higher ground near them usually become infected, evidently because they have been exposed to the wind-scattered spores from above; and in thinned stands, if the disease is present in the neighborhood, almost every chestnut becomes affected. In this instance the frequency of wounds is probably a large contributory cause. Dense woods, as a rule, act as a bar to the progress of the infection; except where the disease is very prevalent in the vicinity, in which case nothing seems to check its spread.

AMOUNT OF DAMAGE.

The amount of loss caused by this disease is especially great, because it has developed in a region where the chestnut trees are extensively used for ornamental and park purposes. For this reason the losses have been acutely felt. There is, of course, no satisfactory basis for estimating the value of trees which are useful chiefly for æsthetic purposes, but the loss is certainly several million dollars.

In Prospect Park, Brooklyn, there are but 6 chestnut trees left alive out of 1,400. In Forest Park, at Jamaica, Long Island, practically all the chestnut trees are diseased and many are dead. The same applies to Bronx Park in New York City. In Nassau County, in western Long Island, few chestnut tracts have escaped serious damage. In Westchester County, N. Y., it is apparently only a question of a short time when nearly all the chestnuts will be destroyed. Many estates have sustained losses in scenic beauty which it is impossible to estimate. In the part of New Jersey adjacent to New York City the damage has been of the same character; parks and country estates have lost large numbers of fine chestnut trees which would not have been sold at any price.

Although so far the injury to ornamental trees has attracted the most attention, the damage is not confined to these alone. Indeed, a far more serious phase of the epidemic is the menace to commercial forest tracts. Already many large tracts in at least five States have been attacked, and though great damage has been done in certain localities, it is very small compared with what it will be if the disease continues to spread.

A favorable feature in the situation is that so far the disease has done most damage in the vicinity of the sea, and there are some indications that back from the sea, where there is less atmospheric moisture, it may be less virulent and may spread less rapidly.

The damage which would result from the destruction or extensive depreciation of the commercial chestnut forests would be many times that from the loss of ornamental trees. Chestnut is one of the most rapidly growing and most useful of American forest trees, and it plays a very important part in the forests of the eastern United States. The wood is exceedingly durable and has, therefore, been extensively used for posts, poles, and railroad ties, while its grain, color, and ease of working give it a place among furniture and finishing woods. It is, moreover, a very vigorous sprouter and lends itself admirably to forest management. With the exception of white pine, chestnut probably makes the most profitable timber crop that can be grown in the northeastern part of the United States.

UTILIZATION OF DEAD AND DISEASED TREES.

Since the fungus does not work in the wood to any extent and ceases its activities when the tree is dead, the wood is not damaged as a result of the disease. In many cases only a part of the tree is affected, while the rest is healthy and can be utilized without difficulty.

Dead trees are looked upon with suspicion, especially if they are killed by a disease, and the wood is popularly thought to be weaker than seasoned live timber. In the case of this fungus there is no

ground for such a prejudice; as a matter of fact, the dead material is fully as strong as any other timber if it is utilized within a few years, before the ordinary agencies of decay cause it to deteriorate.

In most of the places where the disease prevails the problem of cutting and marketing small amounts is a difficult one. The damage from the disease is sudden and it is often hard to find a market on short notice, especially for small quantities.

In order to market the material, owners should encourage the contractors and pole buyers, who as a class are also vitally interested in the perpetuation of the chestnut, to go into sections where the disease is doing damage. Where the tracts are large enough or several are located close together, a portable sawmill might be put in. Where the quantity of chestnut is small, the best disposal is for ties, cordwood, and fence posts. Owners of small tracts where the disease has appeared can often cooperate to great advantage in order to find a market or make a lumbering operation possible.

MEASURES OF PREVENTION.

The chestnut bark disease is not like ordinary fungous diseases which destroy a tree here and there after a number of years; it is even more virulent than the well-known pear blight, which it resembles in many particulars. It destroys quickly and spreads rapidly, and it is of the utmost importance to those who are interested in chestnut forests to secure a means of checking or stamping it out and of preventing its spread to localities which are as yet unaffected.

Seedlings and sprouts are attacked with equal virulence and old and young trees are killed alike. There is, therefore, no system of forestry which can be used to control the disease. Two methods of checking its spread and lessening the source of the infection are available:—

1. To cut out the diseased trees.
2. To institute a quarantine against the shipment of infected material.

In a forest tract the diseased trees should be cut outright—all trees which show the least sign of infection should be removed. In other situations, where the trees have a peculiar value, it may be possible to save them by cutting off the diseased parts only; but if the trunk of a tree is attacked, the whole tree, no matter how valuable it is, should be cut at once, for it is practically useless to try to save it.

Since the disease generally spreads less rapidly in dense stands than in thin ones, it will often be possible by close inspection and the prompt removal of infected trees to stamp out the disease altogether from a forest tract. For the same reason, however, if many diseased trees are to be removed and their removal would make the stand very open, it will often be better to make a clean cut of all the chestnut.

All diseased bark should be removed and burned. After that is done the wood is practically free from infection and can be used or stored with safety.

Even greater effort should be directed toward preventing the spread of the disease to localities which are as yet unaffected than to stamping it out in places where it already has a firm hold.

For this reason, definite legislation seems necessary, and it is very desirable that each State concerned should enact a law providing for a quarantine against infected chestnut products, chiefly nursery stock. The law should also provide for systematic and thorough inspection of the disease and require the cutting out of infected trees wherever they are a menace to healthy stands of chestnut.

The nature of the disease and the necessity of fighting it should be made known to the people throughout the region affected, by means of the press and by enlisting the aid of the granges and other organizations interested.

It is to be hoped that some natural limitation to the destructiveness of the disease may be found, and that it may be checked by natural causes. But its rapid spread and its great virulence make waiting dangerous. Prompt and energetic measures should be taken to stamp it out wherever it appears.